

Global Energy Ventures

Unique green hydrogen investment vehicle

Company update

Industrial support services

19 November 2021

Price **A\$0.13**

Market cap **A\$72m**

A\$1.36/US\$

Estimated net cash (A\$m) at 31 December 2021 17.0

Shares in issue 553m

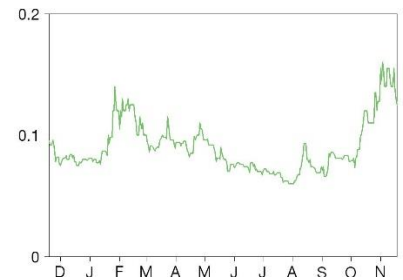
Free float 100%

Code GEV

Primary exchange ASX

Secondary exchange FRA

Share price performance



% 1m 3m 12m

Abs 8.7 62.3 33.0

Rel (local) 8.4 63.5 16.0

52-week high/low A\$0.16 A\$0.06

Business description

Global Energy Ventures is becoming a vertically integrated green hydrogen producer and supplier, combining production and compressed hydrogen shipping solutions for transporting energy from Australia to regional markets in South-East Asia.

Next events

Quarterly update January 2022

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Global Energy Ventures' (GEV's) planned development of a 2.8GW green hydrogen export project in the Tiwi Islands gives credibility and gravity to its ambitious plans to become a vertically integrated producer and supplier of compressed green hydrogen. Internal and external feasibility studies could be realistically expected by early 2023, which could support our existing modelling assumptions that show attractive internal rates of return for a 430t pilot vessel fleet, and for the far more efficient 2,000t vessel design. The Tiwi Hydrogen Project is expected to come onstream in 2026, coinciding with the availability of the first compressed hydrogen ships.

Year end	Revenue (A\$m)	PBT* (A\$m)	EPS* (c)	DPS (c)	P/E (x)	Yield (%)
06/20	1.5	(2.9)	(0.7)	0.0	N/A	N/A
06/21	0.2	(3.1)	(0.7)	0.0	N/A	N/A
06/22e	0.0	(6.4)	(1.3)	0.0	N/A	N/A
06/23e	0.0	(7.4)	(1.3)	0.0	N/A	N/A

Note: *PBT and EPS are on a reported basis.

Tiwi Hydrogen Project: The concept

The Tiwi Hydrogen Project consists of a 1,800 hectare solar PV farm connected by a 30km energy transmission line to a hydrogen production site (electrolyser facilities) located at an existing industrial port. Compression and loading facilities will be sited alongside, which will enable the green hydrogen to be loaded onto GEV's own compressed hydrogen ships. The solar farm has been assessed to have the potential for 2.8GW of electricity generation, sufficient to produce up to 100,000 tonnes of green hydrogen a year.

GEV becomes producer and solution provider

Our original analysis of GEV's C-H2 ship transportation solution assumed ready supplies of green hydrogen would be available from third parties in 2026 to coincide with delivery of the first C-H2 ships. The Tiwi Hydrogen Project de-risks GEV's external reliance on the supply of green hydrogen as GEV is likely to become a vertically integrated producer and supplier of green hydrogen. This brings several advantages including proof of concept, security of supply, cost discovery and supply competition into the equation.

Falling costs underpin cost assumptions

Our original modelling assumed that a supply of green hydrogen would be available to purchase from third parties at a delivered price of US\$4/kg. It is too early in the life of the project to model the costs with any certainty as almost all variables could sway in different directions depending on individual decisions. However, it would be fair to say that the Tiwi Hydrogen Project would allow GEV to capture the producer's margin, while also helping manage the delivered cost of hydrogen to the customer. As technological advances are made in the future, the cost of green hydrogen production has the potential to fall further. It is worth noting that the cost of installed solar PV/kW fell c 82% between 2010 and 2020. According to IRENA, this trend is set to continue, as are the declining costs of associated plant.

Development of H₂ project to prove concept

The chosen location of GEV's first green hydrogen export project is geographically important, as is the support received from local stakeholders including the Tiwi Land Council and the Munupi Landowners. The project is located in one of the most northerly points of Australia; it has suitable climate conditions and is on previously cleared land. The project, if successful, is expected to prove the concept and the economics of green hydrogen production, compression and transportation from Australia to markets in South-East Asia.

Outline of the Tiwi Hydrogen Project

The Tiwi Hydrogen Project consists of a 1,800 hectare solar farm connected by a 30km energy transmission line to a hydrogen production site (electrolyser facilities) planned to be located at an existing industrial port. Compression and loading facilities will be sited alongside, which will enable the green hydrogen to be loaded onto GEV's own compressed hydrogen ships. The solar farm has been assessed to have the potential for 2.8GW of solar generation, sufficient to produce up to 100,000 tonnes of green hydrogen a year.

Exhibit 1: Tiwi Islands Project's proximity to Asia-Pacific export markets



Source: GEV

The Tiwi Islands are among the most northerly locations in Australia, which is strategically important for shipping green hydrogen to emerging markets across Asia-Pacific, including Singapore, Indonesia, South Korea and Japan; see Exhibit 1.

Central to the project is the support from key stakeholders, in particular with the Tiwi Land Council, the Munupi Landowners and the Northern Territory Government. Importantly, unlike a mining or resources project on the Australian mainland, there are no native title agreements required. This implies there is a clear and established process for GEV to negotiate a Section 19 Lease/Licence for the proposed solar site. Management expect the lease to have a duration of at least 20 years.

The proposed solar farm site covers 1,800 hectares of an existing commercial plantation, which means from an environmental approval perspective, the site has already been cleared of native vegetation. The proposed site covers only 6% of the existing plantation area and 0.3% of the total land area of Melville Island, one of the two islands that makes up the Tiwi Islands. It therefore has a low environmental impact. At the hydrogen production site adjacent to the Port Melville, GEV will install small-scale (the size of a shipping container) desalination facilities that will produce the demineralised water for the electrolyzers. In the longer term, local water catchment has potential to supplement the project with fresh water.

Exhibit 2: Tiwi hydrogen project overview



Source: GEV

Port Melville is an existing port owned by AusGroup's NT Port and Marine, and has an existing quay with a draft sufficient for GEV's proposed 430t pilot vessels. Compression of the hydrogen will occur prior to loading, which avoids the complex and capital-intensive process to 'pack and unpack' pure hydrogen gas that is required by other forms of hydrogen transportation such as liquefied hydrogen (LH₂) ammonia (NH₃) or liquid organic hydrogen carriers (LOHC). We believe this is a very important consideration for the end user in the supply chain.

Furthermore, GEV has secured Northern Territory Government support and will go on to seek federal infrastructure funding and support given the new, sustainable industry and economic opportunities for the indigenous communities on the Tiwi Island and Territorian people in general. There are approximately 2,500 people living in the island and the project will employ up to around 50 people at full production. There will be a solid focus on skills training and jobs as part of the project and to support the local communities.

The scalable nature of the project allows GEV to develop a phased approach, initially installing c 0.5GW of solar generation, rising to the full 2.8GW as demand dictates. The phased approach allows GEV and its customers to benefit from cost and efficiency improvements in photovoltaics, electrolyzers and shipping. The Tiwi Hydrogen Project is perfectly located to take advantage of GEV's compressed hydrogen shipping solution. The project will have no need for costly hydrogen storage and minimal requirements for battery storage as the production and loading of hydrogen will 'load follow' the daily and seasonal solar fluctuations.

Exhibit 3: Tiwi Hydrogen Project supply chain



Source: GEV

The next milestones to success

This is early days for this exciting project and in order to drive success over the next few years many elements will need to be secured by GEV. These include:

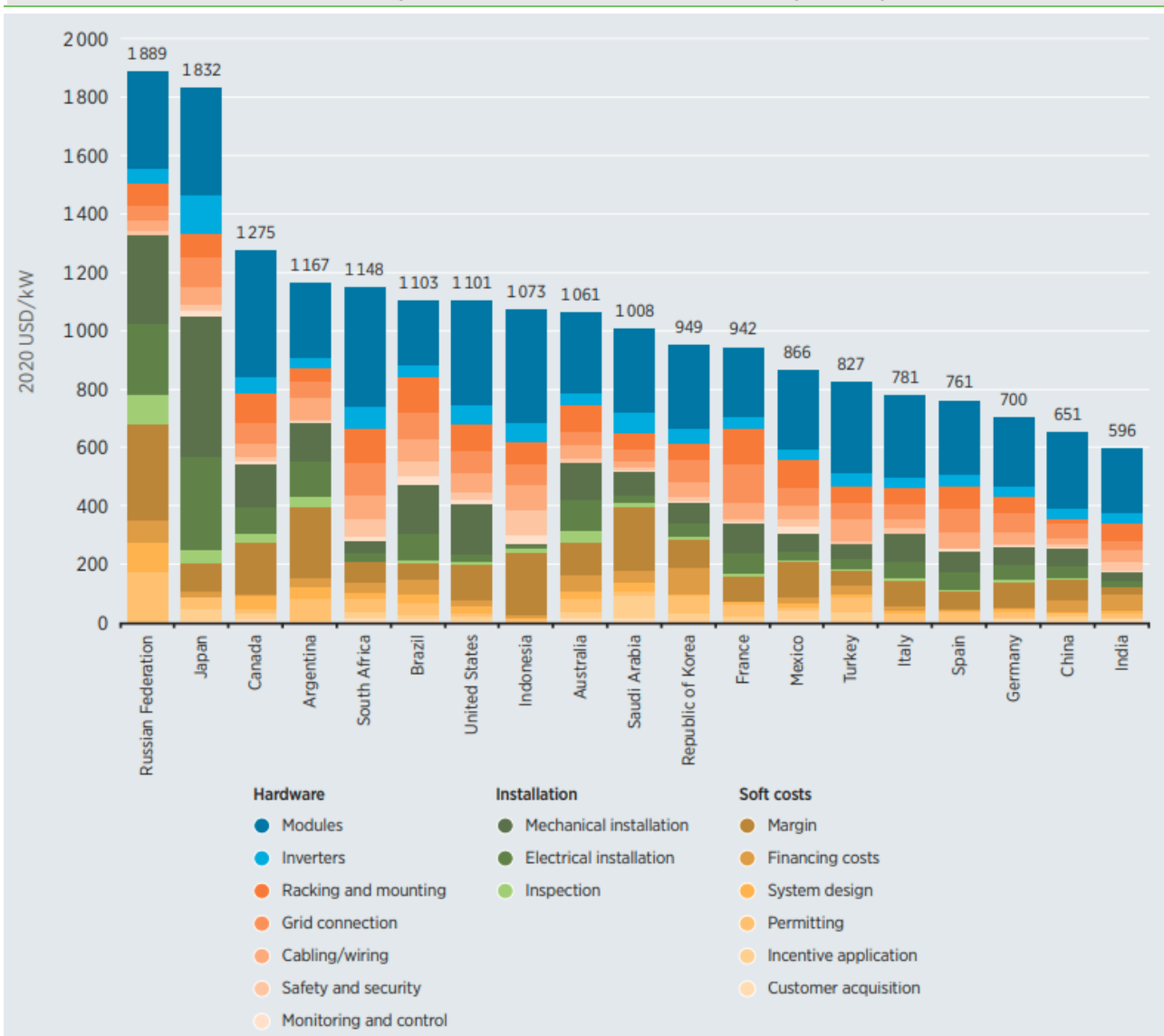
- **Working closely** with the Tiwi Land Council and Munupi Landowners to ensure that the Tiwi Hydrogen Project delivers benefits to the Tiwi people in the form of leasehold payments, employment, and supporting power and water infrastructure.
- **Installing solar monitoring stations** around the solar site to establish 'bankable' solar generation data.
- **Continued discussions** with the Tiwi Plantation Corporation, the Tiwi Land Council and the Munupi Landowners to progress and secure a Section 19 Lease/Licence for the proposed solar site.
- **Continued work** with NT Port and Marine to integrate Port Melville's operations and facilities into the Tiwi Hydrogen Project.
- **Commencing planning for a full feasibility study** including further information on the development schedule, technical partners, the project scale, solar monitoring activities and the appointment of consultants. The project is expected to run parallel to GEV's ABS full class approval programme for its 430t pilot scale ship.

- **The full financial closure for the initial phase** of the project in 2023, with the first hydrogen exports in 2026, subject to all commercial and regulatory approvals and customer offtake agreements being in place.

Falling costs lend weight to the Tiwi project’s feasibility

Assessing the capital and operating costs of the Tiwi Hydrogen Project is extremely difficult currently as there are multiple moving parts that could affect almost every input. We do know, however, that as of 2020, the International Renewable Energy Agency (IRENA) estimated that the average total installed cost of solar photovoltaics (PV) in Australia was US\$1,061/kW, which could imply a total cost of installation of the 2.8GW solar farm of c US\$3bn; see Exhibit 4. In addition, there would be the cost of the 30km transmission line, electrolyser plant, desalination plant and compression equipment.

Exhibit 4: Detailed breakdown of utility-scale solar PV total installed costs by country, 2020



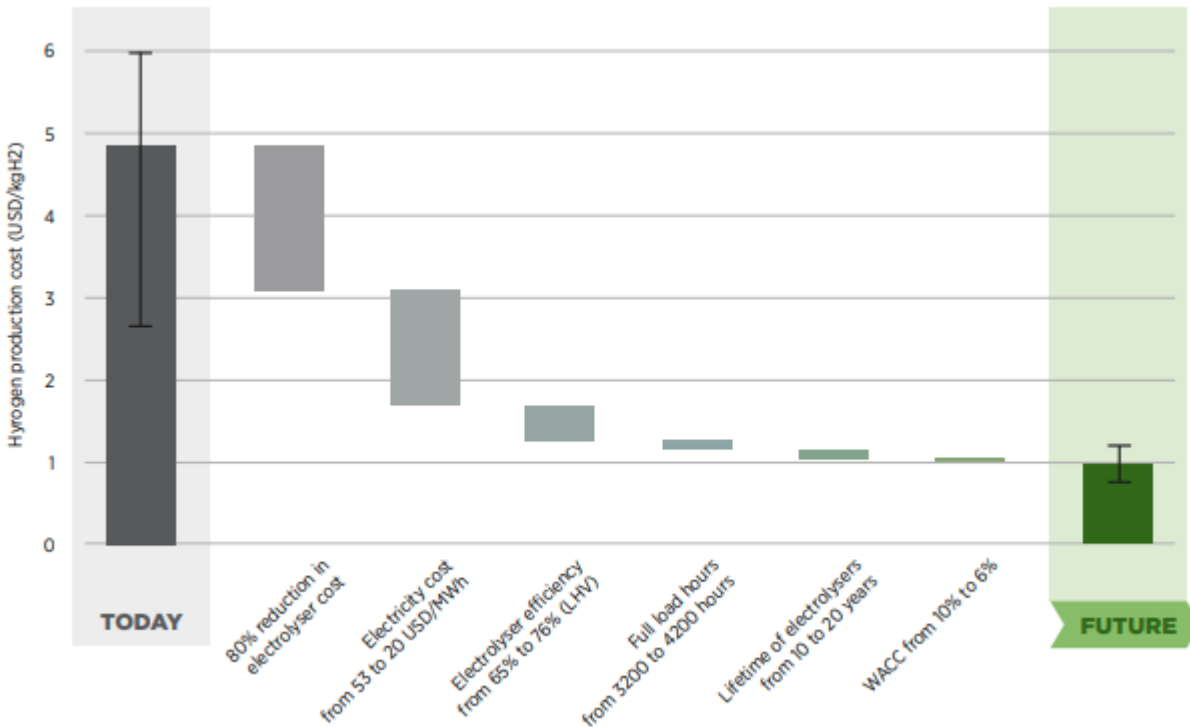
Source: IRENA Renewable Cost Database

A further complicating factor is the perpetually falling cost of solar PV farms. According to IRENA, the global total installed PV system cost for utility-scale systems had fallen c 82% between 2010 and 2020, from US\$4,731/kW, to US\$883/kW. Put another way, the cost halved between 2010, and 2014, and halved again by 2018. By 2020, the cost had fallen by another third, and is arguably on

track to halve again from 2018 levels by 2022 following the trend of halving every four years. Exhibit 5 shows some of the elements of cost reduction. The chart is based on wind energy, but some of the principles of falling costs and increased efficiency apply equally to solar power generation.

The key point is that by the time the Tiwi Hydrogen Project commences construction, the cost of the solar PV farm could be much different (ie much lower) than it is today, underpinning the economics of the project.

Exhibit 5: Step changes for achieving green hydrogen competitiveness



Source: Irena. Note: 'Today' captures best and average conditions, with an average investment of US\$ 770/kW, efficiency of 65% (LHV), an electricity price of US\$ 53/MWh, 3,200 full load hours (onshore wind), a WACC of 10% (relatively high risk). Best conditions are US\$130/kW, efficiency at 76% (LHV), electricity price at US\$20/MWh, 4,200 full load hours (onshore wind), and WACC of 6% (similar to renewable electricity today).

Key announcements on the road to reality

GEV has just raised A\$10m via a placement at A\$0.125/share. In addition, it has raised a further A\$2m via a Share Purchase Plan. The total of A\$12m is sufficient to fully fund the Tiwi Green Hydrogen Project feasibility study, to fund ongoing engineering and approvals for the pilot compressed hydrogen ship, for administration costs and for general working capital.

We believe it is likely that GEV will make further announcements periodically relating to key milestones as the project is worked up. These are likely to include the results of studies, permissions and potentially agreements with third parties such as joint venture partners or offtake customers. The main potential announcements could be:

1. Internal pre-feasibility study – H122
2. Full feasibility study – H222
3. Environmental Protection Agency (EPA) approval, and financial investment decision – H123
4. Solar PV farm construction commencement – H124
5. Installation of electrolysers – 2025
6. Commence electricity and green hydrogen production – 2026.

Exhibit 6: Financial summary

	A\$m	2019	2020	2021	2022e	2023e
Year end 30 June		IFRS	IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT						
Revenue		1.1	1.5	0.2	0.0	0.0
Profit Before Tax (reported)		(8.9)	(2.9)	(3.1)	(6.4)	(7.4)
Reported tax		0.0	0.0	0.0	0.0	0.0
Profit After Tax (reported)		(8.9)	(2.9)	(3.1)	(6.4)	(7.4)
Net income (reported)		(8.9)	(2.9)	(3.1)	(6.4)	(7.4)
Basic average number of shares outstanding (m)		339.2	393.5	417.3	500.1	566.0
EPS – reported (c)		(2.6)	(0.7)	(0.7)	(1.3)	(1.3)
BALANCE SHEET						
Fixed Assets		6.3	6.3	5.8	5.4	5.0
Intangible Assets		6.2	6.2	5.8	5.4	5.0
Tangible Assets		0.0	0.1	0.0	0.0	0.0
Investments & other		0.0	0.0	0.0	0.0	0.0
Current Assets		2.4	3.2	6.7	12.8	11.2
Stocks		0.0	0.0	0.0	0.0	0.0
Debtors		0.0	0.1	0.1	0.1	0.1
Cash & cash equivalents		2.4	3.1	6.6	12.7	11.0
Other		0.0	0.0	0.0	0.0	0.0
Current Liabilities		(0.1)	(0.3)	(0.2)	(0.2)	(0.2)
Creditors		(0.1)	(0.2)	(0.2)	(0.2)	(0.2)
Tax and social security		0.0	0.0	0.0	0.0	0.0
Short term borrowings		0.0	0.0	0.0	0.0	0.0
Other		(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Long Term Liabilities		0.0	0.0	0.0	0.0	0.0
Long term borrowings		0.0	0.0	0.0	0.0	0.0
Other long term liabilities		0.0	0.0	0.0	0.0	0.0
Net Assets		8.6	9.2	12.3	18.0	15.9
Minority interests		0.0	0.0	0.0	0.0	0.0
Shareholders' equity		8.6	9.2	12.3	18.0	15.9
CASH FLOW						
Op Cash Flow before WC and tax		0.0	0.0	0.0	0.0	0.0
Receipts from the ATO (Covid-19 cash boost)		-	0.1	0.1	0.0	0.0
Payments to suppliers and employees		(2.9)	(2.9)	(2.3)	(2.5)	(2.5)
Research and development		(3.2)	(0.1)	(0.0)	(2.0)	(3.0)
Project development		(2.3)	(1.0)	(0.5)	(1.0)	(1.0)
Interest received		0.0	0.0	0.0	0.0	0.0
Interest paid for lease liabilities		-	(0.0)	(0.0)	(0.0)	(0.0)
Research and development tax concession rebate		1.0	1.4	0.2	0.0	0.0
Working capital		0.0	0.0	0.0	0.0	0.0
Exceptional & other		0.0	0.0	0.0	0.0	0.0
Tax		0.0	0.0	0.0	0.0	0.0
Net operating cash flow		(7.4)	(2.5)	(2.6)	(5.5)	(6.5)
Capex		0.0	0.0	0.0	0.0	0.0
Acquisitions/disposals		0.0	0.0	0.0	0.0	0.0
Net interest		0.0	0.0	0.0	0.0	0.0
Equity financing		4.8	3.5	6.3	12.0	5.0
Dividends		0.0	0.0	0.0	0.0	0.0
Other		(0.4)	(0.3)	(0.3)	(0.4)	(0.2)
Net Cash Flow		(3.0)	0.7	3.4	6.1	(1.7)
Opening net debt/(cash)		(5.4)	(2.4)	(3.1)	(6.6)	(12.7)
FX		0.0	0.0	0.0	0.0	0.0
Other non-cash movements		0.0	0.0	0.0	0.0	0.0
Closing net debt/(cash)		(2.4)	(3.1)	(6.6)	(12.7)	(11.0)

Source: GEV and Edison Investment Research

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